P-3039.5 Transpec

CROSSING CONTROL ARM ASSEMBLY

Related Patent Applications

[0001] This application claims priority of U.S. Provisional Application No. 60/440,583 filed January 16, 2003 and U.S. Provisional Application No. 60/404,452 filed August 28, 2002.

Field of the Invention

[0002] This invention relates generally to a crossing control arm assembly and more particularly to a crossing control arm assembly for combination with a school bus front bumper.

Background of the Invention

[0003] U.S. Patent 6,234,105 granted to Ronald C. Lamparter May 22, 2001 discloses a crossing control arm assembly that is attached to the front of a school bus bumper. The crossing control arm assembly has an actuator and a crossing arm that is pivotally attached to the actuator. The crossing arm is stored adjacent the front of the bumper and pivoted outward by the actuator to a deployed position generally perpendicular to the bumper when the school bus stops to pick-up or discharge children. The deployed crossing arm prevents children from walking directly in front of the bus where the bus driver does not have a clear view.

[0004] In the past, school busses were largely designed with "add-on" bumpers that were attached to the chassis by brackets so as to stick out in front of the school bus body to protect the school bus body in a front end collision.

[0005] School busses are now being designed with styling in mind resulting in more aerodynamic looking bus bodies with styled front bumpers that are closer to the school bus body and shaped to blend into the school bus body. Styled front bumpers are more curved and contoured making it difficult to shape the crossing arm for storage adjacent the front of the bumper and an adequate projection in the deployed position.

Summary of the Invention

[0006] This invention provides a crossing control arm assembly that has a crossing arm that can be combined with standard as well as styled bumpers that are curved and contoured; that is easily stored and that has an adequate projection when deployed.

[0007] The crossing arm is preferably stored adjacent the top of the bumper which results in considerable design freedom with respect to choosing curves and contours for the front bumper and the front end of the bus. Alternatively, the crossing arm may be stored adjacent the bottom of the bumper but this position is less desirable.

[0008] The crossing arm is also preferably stored behind the front surface of the bumper and deployed by an actuator that is located behind the front bumper for protection of the crossing arm and the actuator.

[0009] The crossing arm is connected to the actuator by a hinge arrangement that does not require any holes or slots that extend through the bumper to deploy the crossing arm when the actuator is located behind the bumper or any modification to the bumper face to store the crossing arm.

[0010] The crossing arm is preferably connected to the actuator assembly by a U-shaped hinge bracket that is pivotally attached to the actuator assembly at each end for distributing the loads transferred from the crossing arm to the actuator assembly.

[0011] The preferred hinge bracket includes a cross-over link for attaching the crossing arm that may be set at an angle with respect to the parallel legs of the U-shaped bracket to accommodate the contour of the bumper.

Brief Description of the Drawings

[0012] Figure 1 is a front perspective view of a bus equipped with a crossing control arm assembly of the invention;

[0013] Figure 2 is an enlarged front perspective view of the bumper and crossing control arm assembly of figure 1 showing the crossing arm in a stored position atop the bumper;

[0014] Figure 3 is a top view of the crossing arm stored atop the bumper;

[0015] Figure 4 is a section taken substantially along the line 4-4 of figure 2 looking in the direction of the arrows;

[0016] Figure 5 is a view similar to figure 2 showing the crossing arm of the crossing control arm assembly in a deployed position;

[0017] Figure 6 is a section taken substantially along the line 6-6 of figure 5 looking in the direction of the arrows;

[0018] Figure 7 is a front perspective view of the actuator of the crossing control arm assembly that is shown in figure 1;

[0019] Figure 8 is an exploded rear perspective view of the actuator that is shown in figure 7;

[0020] Figure 9 is a top view of an alternate crossing arm stored atop the bumper;

[0021] Figure 10 is a section taken substantially along the line 10-10 of figure 9 looking in the direction of the arrows; and

[0022] Figure 11 is a rear perspective view of an alternate hinge bracket.

Detailed Description of Preferred Embodiments

[0023] Referring now to the drawings, figure 1 shows a bus 10 having a styled front bumper 12 that carries a crossing control arm assembly 14 of the invention. The styled front bumper 12 has a generally straight midsection 16 and curved ends 18 as best shown in figures 2 and 3. Crossing control arm assembly 14 comprises a multi-piece crossing arm 20 that is pivotally attached to an actuator 22.

[0024] Actuator 22 is located behind bumper 12 and attached to a sheet metal bracket 24 by nuts and bolts as best shown in figures 3, 7 and 8. Bracket 24 in turn is attached to the back of bumper 12 by fasteners 25, such as nuts and bolts with the bolts extending through holes in the bumper 12 as best shown in figures 2 and 3.

[0025] Referring now to figure 8 which is an exploded rear perspective view of actuator 22, round upper and lower pivot members 26 and 28 extend through brass journals 30 in the top and bottom walls of a two-piece actuator housing 32. Pivot members 26 and 28 project into housing 32. At least one pivot member, preferably the upper pivot member 26 has a hexagonal or other irregular inner end 34 that is driven by a motor 36 connected to a mating socket 38 that receives the irregular inner end 34 of the pivot member 26 inside the actuator housing 32.

[0026] Pivot members 26 and 28 are part of a U-shaped hinge bracket 40 comprising, metal straps 42 and 44. Metal strap 44 is bent to shape to provide flat, upper and lower legs 46 and 48 that are spaced apart and parallel. Upper leg 26 is attached to the upper metal strap 42 and the lower leg 48 is attached to lower pivot member 28.

Upper metal strap 42 is attached to a generally L-shaped extension comprising a rod 50 and a flat cross-over link 52. Rod 50 has a lower end attached to upper pivot member 26 coaxially and an upper end that is attached to an end of cross-over link 52. Cross-over link 52 extends over the top of the bumper 12 in a cantilever fashion and has a ferrule 54 at a free or distal end for attaching the multi-piece crossing arm 20. Cross-over link 52 is set at a suitable angle with respect to the spaced parallel legs 46 and 48 of hinge bracket 40 to accommodate the contour of the bumper 12.

[0027] The multi-piece crossing arm 20 is stored in a position that is adjacent the top of the bumper 12 and behind a front surface 56 of the bumper 12 as best shown in figure 3. Actuator 22 moves the multi-piece crossing arm 20 via hinge bracket 40 from the stored position of figures 1, 2 and 3 to a deployed position shown in figures 5 and 6. When deployed, the multi-piece crossing arm 20 extends generally perpendicular to an imaginary front plane of the bumper 12 defined at least in part by the front surface 56 of the straight mid section 17. The length of the multi-piece crossing arm 20 is such that the tip 30 is usually about 60 to 62 inches from the front plane of the bumper 12 in the deployed position.

[0028] Actuator 22 may be any type of actuator that can move the crossing arm 20 back and forth between the stored and deployed positions. The actuator may be electric or fluid, including pneumatic. A suitable actuator having an electric motor is disclosed in U.S. Patent No. 5,719,553 granted to Ronald C. Lamparter February 17, 1988. Another suitable actuator having a pneumatic motor is disclosed in U.S. Patent No. 6,435,075 granted to Ronald C. Lamparter et al. August 20, 2002.

[0029] The multi-piece crossing arm 20 includes a member 58 that is preferably a straight round rod and a flap 60 as shown in figures 3 and 4. Flap 60 is preferably colored for high visibility, for example by alternate diagonal black and yellow stripes.

An optional end member 62 may be attached to the end of rod 58 as shown in figure 9. End member 62 may be straight or curved depending upon the shape desired in connection with the contour of the bumper 12. The end member 62 is also preferably a rod.

[0030] Rod 58 is preferably straight and as long as possible taking the curvature of the front bumper 12 into account. The flap 60 includes an integral tube 64 at the rear edge that is pivotally mounted on rod 58. When crossing arm 20 is in the stored position shown in figures 1, 2 and 3, tube 60 preferably fits into one or more clips holders 66 that are attached to the top of bumper 12 as shown in figure 4. The flap 60 may include an optional integral bead 65 at the front edge to reduce flutter of the flap 60 when the crossing arm 20 is in the stored position.

[0031] Flap 60 is stored in a generally horizontal position over bumper 12 as shown in figures 1, 2, 3 and 4 and swings down into a generally vertical position when crossing arm 20 is deployed as shown in figures 5 and 6.

[0032] As indicated above, end member 62 is optional. It may be necessary to include the end member 62 in order to achieve the desired extension in the deployed position, which is usually about 60 to 62 inches. However, in some instances, it may be possible to achieve such an extension with a straight rod 58 or a rod that has an integral curved end. It other instances, the extension achieved by the straight rod 58 may be sufficient in which case the optional end member 62 is not necessary.

[0033] An alternate hinge bracket 140 is shown in Figure 11. Hinge bracket 140 has only one metal strap 142 that is bent to shape to provide not only the spaced, parallel upper and lower legs 146 and 148 but also the cross-over link 152, which in the alternate hinge bracket 140 is an integral coplanar extension of upper leg 146. Lower leg 148 is still attached to the lower pivot member 28 as is the case of hinge bracket

40. However, the upper leg 146 is now attached to the top of the extension rod 50 that is attached to the upper pivot member 26. The cantilevered cross-over link 152 is still set at an angle with respect to legs 146 and 148 to accommodate the contour of bumper 12 and cross-over link 152 still has a ferrule 154 at the free or distal end to attach crossing arm 20.

[0034] While it is preferable to store the multi-piece crossing arm 20 above the bumper, it is also possible to store the multi-piece crossing arm 20 below the bumper. However, the environment below the bumper is much harsher than the environment above the bumper and consequently, it is preferable to store the crossing arm above the bumper.

[0035] When the multi-piece crossing arm 20 is stored below the bumper, it is preferable to provide one or more clip holders similar to clip holder 66 to store flap 60 in a substantially horizontal position beneath the bumper. Such clip holders should take any sag of the deployed crossing arm into account.

[0036] Also, while a single piece flap, such as flap 60 is preferred, a multi-piece flap such as disclosed in U.S. Patent No. 6,234,105 granted to Ronald C. Lamparter May 22, 2001, may also be used.

[0037] In other words, the invention has been described in an illustrated manner and the terminology is intended to be words of description rather than of limitation. Obviously, many modifications and variations of the present invention in light of the above teachings may be made. It is, therefore, to be understood that, within the scope of the appended claims, the invention may be practice otherwise than as specifically described.